

CLAIMS

We claim:

- 5 1. A method of changing an interface, said method comprising the steps
of:
- (a) calling one or more attribute modifiers; and
 (b) modifying a view in response to said one or more attribute modifiers.
- 10 2. The method of claim 1, wherein:
said step (a) includes the step of:
- (1) calling an animator to animate a property of said view; and
said step (b) includes the step of:
- (1) animating said property in response to said animator.
- 15 3. The method of claim 2, further including the steps of:
- (c) calling said animator to animate a property in a second view; and
 (d) animating said property in said second view in response to said
animator.
- 20 4. The method of claim 2, further including the steps of:
- (c) calling a constraint to modify an attribute in response to animating said
property; and
- (d) modifying said attribute in response to said constraint.
- 25 5. The method of claim 4, wherein said attribute is a second property.
6. The method of claim 5, wherein said second property is an attribute of
a second view.
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7. The method of claim 2, wherein:

said step (a)(1) includes the steps of:

- (i) identifying said animator, and
- (ii) providing one or more parameters to said animator; and

said step (b)(1) includes the steps of:

- (i) said animator generating one or more new values for said property during an animation duration, and
- (ii) said view receiving said one or more new values for said property during said animation duration.

8. The method of claim 7, wherein said step (a)(1)(ii) includes the steps

of:

- identifying said property;
- identifying an ending value for said property; and
- identifying said animation duration.

9. The method of claim 7, wherein:

said step (a) includes the step of:

- (2) calling a second animator to animate said property of said view;
- and

said step (b) includes the step of:

- (2) animating said property in response to said second animator during said animation duration.

10. The method of claims 7, wherein said step (b)(1)(i) includes the step

of:

- said animator calling one or more animators; and
- said animator generating said one or more new values for said property in response to said one or more animators.

11. The method of claim 1, wherein:

said step (a) includes the step of:

(1) calling a plurality of animators to animate a plurality of properties of said view; and

said step (b) includes the step of:

(1) animating said plurality of properties in response to said plurality of animators.

12. The method of claim 1, wherein said view identifies a set of child views, and wherein:

said step (a) includes the step of:

(1) calling a layout to layout one or more child views in said set of child views; and

said step (b) includes the step of:

(1) laying out said one or more child views in response to said layout.

13. The method of claim 12, further including the steps of:

(c) calling said layout to layout one or more child views identified by a second view; and

(d) laying out said one or more child views identified by said second view in response to said layout.

14. The method of claim 12, wherein said step (b)(1) includes the step of:

(i) changing at least one attribute in said one or more child views.

15. The method of claim 14, further including the steps of:

(c) calling a constraint to modify an attribute in response to changing said at least one attribute ; and

(d) modifying said attribute in response to said constraint.

16. The method of claim 15, wherein said attribute is a second property.

17. The method of claim 16, wherein said second property is an attribute
5 of a second view.

18. The method of claim 12, wherein said step (b)(1) includes the step of:
(i) said layout calling one or more animators to animate said one or more
child views.

10 19. The method of claim 18, wherein said step (b)(1) further includes the
step of:

(ii) said one or more animators providing said layout with one or more
new values for properties in said one or more child views.

15 20. The method of claim 12, wherein:
said step (a) further includes the step of:

(2) calling an animator to animate a property of said view; and

said step (b) further includes the step of:

20 (2) animating said property in response to said animator.

21. The method of claim 1, wherein said view identifies a child view and
said method further includes the steps of:

(c) calling one or more attribute modifiers for said child view; and

25 (d) modifying said child view in response to said one or more attribute
modifiers called in said step (c).

22. The method of claim 21, wherein:
said step (c) includes the step of:

(1) calling an animator to animate a property of said child view;
and

said step (d) includes the step of:

(1) animating said property in said child view in response to said
animator called in said step (c)(1).

23. The method of claim 1, wherein said step (a) is performed in response
to a change in an attribute.

24. One or more processor readable storage devices having code embodied
on said processor readable storage devices, said code for programming one or more
processors to perform a method of changing an interface, said method comprising the
steps of:

- (a) calling one or more attribute modifiers; and
- (b) modifying a view in response to said one or more attribute modifiers.

25. One or more processor readable storage devices according to claim 24,
wherein:

said step (a) includes the step of:

(1) calling an animator to animate a property of said view; and

said step (b) includes the step of:

- (1) animating said property in response to said animator.

26. One or more processor readable storage devices according to claim 25,
wherein said method further includes the steps of:

- (c) calling said animator to animate a property in a second view; and
- (d) animating said property in said second view in response to said
animator.

27. One or more processor readable storage devices according to claim 25,
wherein said method further includes the steps of:

(c) calling a constraint to modify an attribute in response to animating said property; and

(d) modifying said attribute in response to said constraint.

5 28. One or more processor readable storage devices according to claim 27, wherein said attribute is a second property in an attribute of a second view.

 29. One or more processor readable storage devices according to claim 25, wherein:

10 said step (a)(1) includes the steps of:

 (i) identifying said animator, and

 (ii) providing one or more parameters to said animator; and

 said step (b)(1) includes the steps of:

15 (i) said animator generating one or more new values for said property during an animation duration, and

 (ii) said view receiving said one or more new values for said property during said animation duration.

20 30. One or more processor readable storage devices according to claim 29, wherein:

 said step (a) includes the step of:

 (2) calling a second animator to animate said property of said view;

 and

 said step (b) includes the step of:

25 (2) animating said property in response to said second animator during said animation duration.

 31. One or more processor readable storage devices according to claims 29, wherein said step (b)(1)(i) includes the step of:

30 said animator calling one or more animators; and

said animator generating said one or more new values for said property in response to said one or more animators.

32. One or more processor readable storage devices according to claim 24,
5 wherein:

said step (a) includes the step of:

(1) calling a plurality of animators to animate a plurality of properties of said view; and

said step (b) includes the step of:

10 (1) animating said plurality of properties in response to said plurality of animators.

33. One or more processor readable storage devices according to claim 24,
wherein said view identifies a set of child views, and wherein:

15 said step (a) includes the step of:

(1) calling a layout to layout one or more child views in said set of child views; and

said step (b) includes the step of:

20 (1) laying out said one or more child views in response to said layout.

34. One or more processor readable storage devices according to claim 33,
wherein said method further includes the steps of:

25 (c) calling said layout to layout one or more child views identified by a second view; and

(d) laying out said one or more child views identified by said second view in response to said layout.

35. One or more processor readable storage devices according to claim 33,
30 wherein said step (b)(1) includes the step of:

- (i) changing at least one attribute in said one or more child views.

36. One or more processor readable storage devices according to claim 35, wherein said method further includes the steps of:

- (c) calling a constraint to modify an attribute in response to changing said at least one attribute ; and
- (d) modifying said attribute in response to said constraint.

37. One or more processor readable storage devices according to claim 36, wherein said attribute is a second property in an attribute of a second view.

38. One or more processor readable storage devices according to claim 33, wherein said step (b)(1) includes the step of:

- (i) said layout calling one or more animators to animate said one or more child views.

39. One or more processor readable storage devices according to claim 38, wherein said step (b)(1) further includes the step of:

- (ii) said one or more animators providing said layout with one or more new values for properties in said one or more child views.

40. One or more processor readable storage devices according to claim 33, wherein:

said step (a) further includes the step of:

- (2) calling an animator to animate a property of said view; and

said step (b) further includes the step of:

- (2) animating said property in response to said animator.

41. One or more processor readable storage devices according to claim 24, wherein said view identifies a child view and said method further includes the steps of:

(c) calling one or more attribute modifiers for said child view; and

(d) modifying said child view in response to said one or more attribute modifiers called in said step (c).

42. One or more processor readable storage devices according to claim 41, wherein:

said step (c) includes the step of:

(1) calling an animator to animate a property of said child view;

and

said step (d) includes the step of:

(1) animating said property in said child view in response to said animator called in said step (c)(1).

43. One or more processor readable storage devices according to claim 24, wherein said step (a) is performed in response to a change in an attribute.

44. An apparatus comprising:
one or more storage devices; and
one or more processors in communication with said one or more storage devices, said one or more processors perform a method of changing an interface, said method comprising the steps of:

(a) calling one or more attribute modifiers; and

(b) modifying a view in response to said one or more attribute modifiers.

45. The apparatus of claim 44, wherein:

said step (a) includes the step of:

(1) calling an animator to animate a property of said view; and

said step (b) includes the step of:

- (1) animating said property in response to said animator.

46. The apparatus of claim 45, wherein said method further includes the steps of:

- (c) calling a constraint to modify an attribute in response to animating said property; and
- (d) modifying said attribute in response to said constraint.

47. The apparatus of claim 45, wherein:

said step (a)(1) includes the steps of:

- (i) identifying said animator, and
- (ii) providing one or more parameters to said animator; and

said step (b)(1) includes the steps of:

- (i) said animator generating one or more new values for said property during an animation duration, and
- (ii) said view receiving said one or more new values for said property during said animation duration.

48. The apparatus of claim 47, wherein:

said step (a) includes the step of:

- (2) calling a second animator to animate said property of said view; and

said step (b) includes the step of:

- (2) animating said property in response to said second animator during said animation duration.

49. The apparatus of claim 44, wherein said view identifies a set of child views, and wherein:

said step (a) includes the step of:

(1) calling a layout to layout one or more child views in said set of child views; and

said step (b) includes the step of:

(1) laying out said one or more child views in response to said layout.

50. The apparatus of claim 49, wherein said step (b)(1) includes the step of:

(i) changing at least one attribute in said one or more child views.

51. The apparatus of claim 50, further including the steps of:

(c) calling a constraint to modify an attribute in response to changing said at least one attribute ; and

(d) modifying said attribute in response to said constraint.

52. The apparatus of claim 49, wherein said step (b)(1) includes the steps of:

(i) said layout calling one or more animators to animate said one or more child views; and

(ii) said one or more animators providing said layout with one or more new values for properties in said one or more child views.

53. The apparatus of claim 49, wherein:

said step (a) further includes the step of:

(2) calling an animator to animate a property of said view; and

said step (b) further includes the step of:

(2) animating said property in response to said animator.

54. The apparatus of claim 44, wherein said step (a) is performed in response to a change in an attribute.

55. A method comprising the steps of:

- (a) receiving a request for an interface;
- (b) transmitting an interface engine in response to said request, wherein

5 said interface engine includes processor readable code for programming one or more processors to perform an interface method of providing and changing said interface, said interface method comprising the steps of:

- (1) calling one or more attribute modifiers; and
- (2) modifying a view in response to said one or more attribute modifiers.

10 56. The method of claim 55, wherein:

said step (1) includes the step of:

- (i) calling an animator to animate a property of said view; and

said step (2) includes the step of:

- (i) animating said property in response to said animator.

15 57. The method of claim 56, wherein said interface method further includes the steps of:

- (3) calling said animator to animate a property in a second view; and
- 20 (4) animating said property in said second view in response to said animator.

58. The method of claim 56, wherein said interface method further includes the steps of:

- 25 (3) calling a constraint to modify an attribute in response to animating said property; and
- (4) modifying said attribute in response to said constraint.

30 59. The method of claim 58, wherein said attribute is a second property in an attribute of a second view.

60. The method of claim 56, wherein:

said step (1)(i) includes the steps of:

identifying said animator, and

providing one or more parameters to said animator; and

said step (2)(i) includes the steps of:

said animator generating one or more new values for said property during an animation duration, and

said view receiving said one or more new values for said property during said animation duration.

61. The method of claim 59, wherein:

said step (1) includes the step of:

(ii) calling a second animator to animate said property of said view;

and

said step (2) includes the step of:

(ii) animating said property in response to said second animator during said animation duration.

62. The method of claim 55, wherein said view identifies a set of child views, and wherein:

said step (1) includes the step of:

(i) calling a layout to layout one or more child views in said set of child views; and

said step (2) includes the step of:

(i) laying out said one or more child views in response to said layout.

63. The method of claim 62, wherein said interface method further includes the steps of:

(3) calling said layout to layout one or more child views identified by a second view; and

(4) laying out said one or more child views identified by said second view in response to said layout.

64. The method of claim 62, wherein said step (1)(i) includes the step of:
(i) changing at least one attribute in said one or more child views.

65. The method of claim 64, wherein said interface method further includes the steps of:

(3) calling a constraint to modify an attribute in response to changing said at least one attribute ; and

(4) modifying said attribute in response to said constraint.

66. The method of claim 62, wherein said step (1)(i) includes the steps of:
said layout calling one or more animators to animate said one or more child views; and

said one or more animators providing said layout with one or more new values for properties in said one or more child views.

67. The method of claim 62, wherein:
said step (1) further includes the step of:

(ii) calling an animator to animate a property of said view; and
said step (2) further includes the step of:

(ii) animating said property in response to said animator.

68. The method of claim 55, wherein said view identifies a child view and said method further includes the steps of:

(3) calling one or more attribute modifiers for said child view; and

(4) modifying said child view in response to said one or more attribute modifiers called in said step (3).

69. The method of claim 68, wherein:

5 said step (3) includes the step of:

(i) calling an animator to animate a property of said child view;
and

said step (4) includes the step of:

(i) animating said property in said child view in response to said
10 animator called in said step (3)(i).

70. The method of claim 44, wherein said step (1) is performed in response to a change in an attribute.

15 71. One or more processor readable storage devices having code embodied on said processor readable storage devices, said code for programming one or more processors to perform a method of implementing an interface, said method comprising the steps of:

(a) setting attributes for one or more views; and

20 (b) calling one or more attribute modifiers to modify one or more attributes in said one or more views.

72. One or more processor readable storage devices according to claim 71, wherein said step (b) includes the step of:

25 (1) calling a first attribute modifier in said one or more attribute modifiers to modify an attribute for a first view in said one or more views; and

(2) calling said first attribute modifier to modify an attribute for a second view in said one or more views.

73. One or more processor readable storage devices according to claim 71, wherein each attribute modifier in said one or more attribute modifiers can be called by a plurality of views in said one or more views.

5 74. One or more processor readable storage devices according to claim 71, wherein said set of attribute modifiers includes one or more animators, one or more layouts, and one or more constraints.

10 75. One or more processor readable storage devices according to claim 71, wherein, said step (b) includes the steps of:

- (1) identifying an attribute modifier; and
- (2) providing one or more parameters to said attribute modifier.

15 76. One or more processor readable storage devices according to claim 75, wherein said method further includes the step of:

- (c) said one or more attribute modifiers generating values for said one or more attributes.

20 77. One or more processor readable storage devices according to claim 76, wherein said step (c) includes the steps of:

- (1) a plurality of attribute modifiers in said one or more attribute modifiers receiving one or more parameters; and
- (2) each attribute modifier in said plurality of attribute modifiers generating a plurality of attribute values for an attribute.

25 78. One or more processor readable storage devices according to claim 77, wherein said one or more parameters identify a desired ending attribute value, wherein said plurality of attribute values lead up to said desired ending attribute value.

79. One or more processor readable storage devices according to claim 78, wherein said plurality of attribute values are provided separately over a time period.

5 80. One or more processor readable storage devices according to claim 76, wherein said step (c) includes the steps of:

(1) said attribute modifier identified in said step (b)(1) generating at least one value for an attribute in response to said one or more parameters provided in said step (b)(2).

10 81. One or more processor readable storage devices according to claim 80, wherein said attribute is a view property.

82. One or more processor readable storage devices according to claim 80, wherein said attribute modifier is an animator.

15 83. One or more processor readable storage devices according to claim 82, wherein said one or more parameters includes an animation duration and said step (c)(1) includes the step of:

20 (i) said animator generating a plurality of new values for said attribute during said animation duration in response to said one or more parameters.

84. One or more processor readable storage devices according to claim 80, wherein said attribute modifier is a layout.

25 85. One or more processor readable storage devices according to claim 84, wherein said step (c)(1) includes the step of:

(i) said layout modifying one or more child views identified by a view in said one or more views.

86. One or more processor readable storage devices according to claim 80, wherein said attribute modifier is a constraint.

87. One or more processor readable storage devices according to claim 86, wherein said step (c)(1) includes the step of:

(i) said constraint generating a new value for said attribute, wherein said new value is a function of an attribute other than said attribute.

88. One or more processor readable storage devices according to claim 71, wherein said step (b) is performed in response to one or more events.

89. One or more processor readable storage devices according to claim 88, wherein said one or more events includes an attribute being modified.

90. One or more processor readable storage devices having code embodied on said processor readable storage devices, said code for programming one or more processors to perform a method of implementing an interface, said method comprising the steps of:

- (a) implementing one or more views; and
- (b) implementing one or more attribute modifiers.

91. One or more processor readable storage devices according to claim 90, wherein said step (a) includes the steps of:

- (1) setting attributes for said one or more views; and
- (2) calling attribute modifiers in said one or more attribute modifiers to modify one or more attributes in said one or more views.

92. One or more processor readable storage devices according to claim 91, wherein said one or more attribute modifiers include animators, layouts, and constraints.